Fundamental Question: Do Retailers Have Market Power?

Rivalry in Semi-Perishable Produce Markets

Sweeping generalizations of how buying and selling prices are determined in produce markets are invalid if not impossible. Each fruit and vegetable market is distinct. However, to be useful, economic models of price determination must separate which market differences are important from those that may be plausibly assumed to be constant. The commodity markets considered here are all semi-perishable—each can be stored either on the tree or in cold storage for a significant amount of time.

Other studies concerning produce price determination explicitly consider the extreme perishability of fresh farm products (Sexton and Zhang). In cases of extreme perishability, supply is fixed when price is above marginal harvesting costs, but supply falls to zero for prices below the cost of harvesting. When prices make harvesting feasible, any surplus returns above the cost of harvesting are divided among buyers and sellers according to their relative bargaining power in the market, which is largely influenced by the amount of supply. If the product is storable for a significant amount of time (grapes, apples, oranges, or grapefruit) or is manufactured (bagged salads), this type of pricing mechanism does not apply. However, it is still true that the grower price for nonmanufactured fresh fruits is likely influenced by the relative bargaining power of retail buyers on one side and grower-shippers on the other. Given that growers are often separated by large distances and do not have a history of effective coordination, retail buyers are more likely able to set prices.

As such, retail industry members must consider how each rival uses their own power in setting prices to growers. Given the relative inelasticity of supply at any point in time, and the fact that category management and efficient consumer response methods rely on using price as a strategic tool, it is more likely that this rivalry takes the form of competing on offered prices on both the buying and selling sides rather than on quantities purchased. Similarly, these same buyers often interact in common retail markets as produce sellers. With the amounts that they sell determined by their buyers often weeks ahead of time, amounts that are in turn determined by the prices paid to growers, rivalry at this stage is again in prices rather than quantities. This assumption is supported by survey evidence that finds almost 70 percent of produce sellers set prices according to their rivals' behavior (McLaughlin et al.). However, this simple model of retailer interaction considers only their single-period or static rivalry. Reality is far more complex and dynamic, with rivals learning from one another and revising strategies to allow for cooperation and mutual benefit.

An Economic Model of Strategic Pricing Among Retailers

The fact that retail produce prices remain fixed for long periods of time, despite wide swings in shipping-point prices, supports Stiglitz's notion that retail price fixity derives from a fundamental success in coordination among retailers, rather than a failure as suggested by Ball and Romer. Indeed, arguments that retailers cannot possibly share information efficiently enough to support an implicitly cooperative outcome similar to that described by Green and Porter fail to recognize the popularity of "food pages" in the weekend paper, the proximity of retail grocery stores within U.S. cities, and the fact that most metropolitan areas are effectively served by only three or four major chains. Clearly, to sustain noncompetitive pricing, there must be some means by which rivals do not formally cooperate with one another to fix prices.

By interacting on a daily basis, the repeated nature of rival firms' decisions can lead to tacit, or implicit, coordination. Moreover, other studies explain similar price patterns that we observe here as resulting from factors unrelated to market power - consumer search costs (Bils; Lal and Matutes), fixed or "menu costs" of price adjustment (Slade 1998; Sheshinski and Weiss) or simply cyclical fluctuations in supply and demand (Rotemberg and Saloner; Warner and Barsky; Sexton and Zhang). Indeed, ours is but one among several explanations of observed price patterns in the retail produce industry.

There is a large body of research that attempts to explain price wars as outcomes arising from repeated interactions between firms. Slade (1990) categorizes these theories into three groups: learning models where firms use price wars to cause rivals to reveal their costs (Slade, 1987), cyclical models wherein the strength of industry demand influences the incentives to cooperate or not (Rotemberg and Saloner; Haltiwanger and Harrington; Hajivisilliou), or "imperfect monitoring" models (Green and Porter; Abreu et al.). Because the grocery industry is relatively stable, its members often next to one another in shared markets, and capable of only imperfect competitive monitoring due to the multi-product nature of their format permits, it is clear that the "trigger price" model is the most plausible.

Using the logic of Green and Porter and Porter (1983), Lee and Porter explain the episodic price wars engendered by the Joint Executive Committee (JEC) in the U.S. rail industry of the late 1800s. Porter (1983), however, assumes that the punishment strategy is carried out in quantities, much like dumping product on the market to lower prices, while Brander and Zhang allow for either price cutting or dumping supply on the market. Using firm-specific data on duopoly airline routes, Brander and Zhang find considerable support for this type of trigger model in quantity. Koontz et al. find support for a trigger price specification in the U.S. meat packing industry - an industry with supply conditions very similar to what we see in fresh produce. Further, Hajivassiliou, using the JEC data, tests a trigger price model against one in which behavior is explained by cyclical changes in demand and rejects the latter, but can not reject the implications of the former.

Consequently, there is considerable empirical support for imperfect monitoring models in general, but less for other dynamic oligopoly models. More important, the way in which fresh produce is bought and sold is highly conducive to the type of information flow required for an imperfect monitoring model to function. First, imperfect price signals are likely to exist in relatively thin markets, such as the market for fresh produce, because buyers deal with hundreds of suppliers where formal price announcements are logistically impossible (Koontz et al.). Second, most markets are seasonal so buyers are likely to interact with different sellers at various times during the year. Third, the supply facing one retail buyer is likely to be influenced by both rival behavior and the inherent randomness of supply. Finally, retail buyers form a small group within each region, so they can easily share information among each other (implicitly) through negotiations with large sellers or selling groups. Ultimately, however, the true test of which model is most appropriate is found in the data itself.

Our description of the imperfect monitoring model should make it clear that, although the best outcome from the perspective of buyers is to cooperate in all periods, thus earning a share of monopoly profits throughout, this is not a realistic description of what we observe given the uncertainty inherent in market prices and rivals' strategies. Rather, it is more likely that retail produce buyers, if they are able to tacitly cooperate with each other, do so by cooperating when market prices are clearly in their favor. They respond to cheating on this "agreement" with punishments that take the form of competitive pricing (Green and Porter; Porter (1983); Koontz et al.). Such punishments are likely expected by other firms in the industry because cheating cannot be tolerated by firms interested in making the most profit possible year after year in bargaining with the same set of suppliers.

Implications of Dynamic Model of Rivalry

Retailers' adherence to fixed-price policies form a key part of any category management program. We argue here that they also facilitate tacit cooperation among their rivals in both their buying and selling activities. In terms of the prices that are observed in raw product and retail markets, the prediction of this model is that retail prices will vary over time, alternating between regimes of punishment and cooperation among retailers. During cooperative periods, prices are bound between a competitive level and a monopolistic one depending upon the extent to which rivals are able to effectively agree on a common price. When the industry is undergoing punishment, however, margins will reflect buying prices bound between the competitive level and somewhat above pure monopsony in the extreme. On the buying side, firms are assumed to punish their rivals by periodically paying a relatively high price when profits in the previous period fall below some trigger level. However, they cooperate with their rivals when profits are above the trigger. Together, these two regimes constitute a pricing strategy, wherein high shipper prices are maintained only long enough to restore the tacit agreement to set prices paid to growers.

Example of Discontinuous Behavior

Typically, evidence of such on-again, off-again behavior consists of periodic price wars (Slade ,1990; Brander and Zhang) or, in a more general model of rivalry with multiple tools, advertising campaigns (Slade 1995; Gasmi et al.). In the retail produce industry, however, rival grocers attempt to gain temporary market advantage, and thereby punish rivals, with periodic price promotions. In order to meet the increase in the quantity of produce demanded during these periods, retailers must pay shippers higher prices than would otherwise be the case. Therefore, we expect to observe falling profits during periods of aggressive price-promotion activity. Notice that a fall in profits during periods of relatively high volume is contrary to predictions of models of imperfect competition in perishable produce markets (Sexton and Zhang). These conflicting conclusions are not inconsistent with each other, however, as suppliers of "perfectly perishable" commodities are constrained by the amount of produce they have to sell and have little flexibility to increase or decrease supply during promotional periods. In order to test whether these predictions are consistent with our data on semi-perishable fruit sales and margins, we construct a statistical model that allows the extent of cooperation to vary with the amount of produce sold by retailers and, hence, sold by fruit suppliers. We describe the way in which we analyze the relevant fruit data next on a heuristic or intuitive level, and leave the formal development to a technical appendix.